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Community Awareness on Typhoon and Assessment on Hazard Mitigation Practices of the Local Government Unit of Malvar, Batangas, Philippines

[1,]Aerielle Claire Castillo, [2,]Jesreel D. Linga, [3,]Genalyn P. Lualhati
[1,] *Lyceum of the Philippines University, Calamba, Laguna, Philippines*
[2,] *Saint Thomas Academy, Sto. Tomas, Batangas, Philippines*
[3,] *Batangas State University-JPLPC Campus, Batangas, Philippines*

ABSTRACT: *The undertaking determined the community awareness on typhoon and assesses the hazard mitigation practices with an end view of drawing the suggested activities to the office of the disaster information and risk reduction programs of the Local Government Unit of Malvar. This descriptive study covered the household heads in the municipality. They gathered data through a researcher-made questionnaire. The results revealed that majority of the respondents were aware on typhoon and assessed the hazard mitigation practices of the municipality as good. Considering the result, it was recommended that the locality may conduct seminars, workshops and orientation programs on terminologies regarding typhoon and other environmental issues. Drills and simulations in the school and community may be exercised. In addition, they may also raise funds to provide the needed supplies of the community. The aforementioned activities may be given emphasis by the concerned authorities or agencies for maximum implementation.*

KEYWORDS: *Typhoon, Mitigation Practices, Disaster, Risk Reduction, Environment*.

I. INTRODUCTION

The beauty and wonder of the Earth is evident. It comprises the natural resources which sustain the needs of people belonging to the community. Since humans are not self-sufficient, it is in this juncture that an environmentally aware and literate populace is more indispensable than ever. This requirement is normally perceived to be of immense importance due to the continuous destruction of our environment brought by man's undertakings. Over the centuries, all countries aspire to be progressive not considering the impact this advancement may have on nature. Numerous researches revealed that people became abusive of the environment. In fact, one of the drastic effects it brought was natural disasters which have grown into a bigger scale because of climate change. These natural processes of the Earth are bound to happen and it is accepted; however, due to environmental issues it became too serious and calamitous causing great threat to properties and even lives.

A natural hazard is a threat of a naturally occurring event which has a negative effect on humans. The negative effect is referred to as natural disaster. Disaster involving natural hazards can have devastating short and long-term impacts on the society and the economy of any country, adversely affecting progress towards sustainable development. They cause loss of life, social disruption and affect economic activities. They also cause environmental damage such as loss of fertile agricultural land and water contamination. The overall number of people affected by disasters has been increasing until now. In the Philippines, the most common natural hazard is typhoon. Typhoons are strong low pressures that bring powerful winds, torrential rains and cause storm surge along coasts, and trigger landslides and flash floods in the mountains. The Philippines is located in a very active volcano zone known as the Pacific Ring of Fire and in the geologically unstable region between the Pacific and Eurasian tectonic plates which made it prone to typhoons. It also lies along the typhoon belt where most typhoons occur (Asian Disaster Reduction Center, 2008).

There have been many natural disasters that have stolen human lives and left destruction and havoc to everyone. The Super Typhoon "Yolanda" (Haiyan) in 2013 was probably the worst natural disaster many people experienced in recent times. Within the Philippines, the National Disaster Risk Reduction and Management Council (NDRRMC) confirmed that over 6,100 people were killed by Super Typhoon Yolanda. According to the Red Cross (2013), each year 130,000 people are killed, 90,000 are injured and 140 million are affected by natural disaster.

With these statistics of devastation, the role of NDRRMC is very important. The agency is tasked to come up with a framework for disaster risk reduction and management, as well as, supervise preparations for, and responses to, natural calamities and human-induced disasters. NDRRMC must also establish linkage and network with local government units for disaster risk reduction and emergency response purposes. According to the Local Government Code of 1991, Local Government Units (LGUs) are expected to be at the frontline of emergency measures in the aftermath of disasters to ensure the general welfare of its constituents. The Local Government Unit of Malvar is one of the municipalities in the Province of Batangas. The researchers believed that it would be best to conduct the research among the household heads of every family in 15 barangays of the Municipality of Malvar because they are the one who are responsible in supervising the family members in times of natural catastrophes. LGUs, as first responders, should be proactive in performing disaster-related activities, from preemptive evacuation to the restoration of people's livelihood.

Awareness of the people on typhoon is not enough. There is a need to have coordination between NDRRMC and LGUs to minimize the effects of natural disaster. As the saying goes, "Prevention is better than cure." It would be better if every individual will be informed about the hazard mitigation practices that should be utilized in order to reduce the consequences of natural hazards. Hazard mitigation practices are actions to reduce or prevent future damage, preferably before a disaster strikes. Based on the disaster action plan, the community shall initiate mitigation measures, which may be physical structures, early warning system, planning tools and health-related measures. In the study of Nath (2009) which determined the holistic approach to disaster management for a sustainable future, it was found out that the role of students, teachers, machines and media in efficient disaster management systems is vital for a sustainable future of life on Earth. He concluded that preparation, mitigation, rescue and relief, and rehabilitation are really the main phases in a disaster management. It was recommended that isolated thoughts, preparation, awareness programs and other activities should be cooperatively integrated with the participation of all sections of the community because disaster has no reservation to any special sections of community.

In this regard, future educators must realize that for the Filipinos to be aware of environmental issues, concerns and natural hazard practices, they need to be competent enough in mainstreaming these pressing issues in their instruction. To make the learners' understanding of this matter holistic, this must be taught to them in all subjects they have. It is in the hands of these next generation environmentalist-teachers lies the renewal of our forest and conservation of natural resources. Further, scientists, inventor and technologists must develop and discover further knowledge and practice to respond to the risks and opportunities of global environmental change and support the societal transformation toward global sustainability.

Objectives of the Study : This descriptive study concentrated on the awareness on typhoon as a natural disaster and assessment on hazard mitigation practices of the Local Government Unit among the household heads of Malvar, with an end view of drawing the suggested activities to the office of the disaster information and risk reduction program of the Municipality of Malvar. The study sought the respondents' profile in terms of sex, age, length of stay in the barangay and monthly family income. It also determined the level of awareness of the respondents on typhoon as a natural disaster. This undertaking revealed the respondents' assessment on hazard mitigation practices of the barangays in terms of physical structures, early warning, planning tools and health-related measures. With the importance of creating civic-minded and environmentally literate populace that had been previously discussed that this study was conceptualized. The researchers who are Science educators want to be more acquainted and more responsive to the activities in promoting awareness about natural disaster and hazard mitigation practices which greatly affects the environment and society. Moreover, the researchers believe that it is their duty to forge a unified environmental science instruction for a peaceful, equitable and habitable Earth.

II. MATERIALS AND METHODS

Research Design: The researchers utilized descriptive research methodology. Natural disaster is one of the existing disastrous conditions in the country. The common natural hazard that is being experienced by the country is typhoon. The researchers believed that it would be best to describe the present situation through utilizing the descriptive research design.

Subject of the Study: It was administered in the 15 barangays in the Local Government Unit of Malvar. Considering the study's scope and time allotted to conduct the study, the researchers only used 10 household heads per barangay. Household heads are in best position to answer the instrument as they are the decision-maker in their respective homes. Hence, the total population of the respondents was 150.

Further, the researchers used Quota sampling. It is a non-probability sampling technique wherein the assembled sample has the same proportions of individuals as the entire population with respect to known characteristics, traits or focused phenomenon (Calmorin et al., 2006). The researchers believed that this is the best method to be used because of resources constraints.

Instrumentation: The study used a researcher-made questionnaire to determine the level of awareness on typhoon as a natural disaster and assessment on hazard mitigation practices of the Local Government Unit of Malvar. The questionnaire was composed of three parts. The first part focused on the profile of the respondents in terms of sex, age, length of stay and monthly family income. The next part dealt with the respondents' level of awareness on typhoon as a natural disaster while the last part determined the assessment on hazard mitigation practices of Local Government Unit of Malvar in terms of physical structures, early warning, planning tools and health-related measures.

In determining the respondents' level of awareness on typhoon as a natural disaster, the following mean ranges with their corresponding interpretations were used.

Numerical Value	Mean Ranges	Interpretation
4	3.25-4.00	Strongly Agree/Highly Aware
3	2.50-3.24	Agree/Aware
2	1.75-2.49	Disagree/Slightly Aware
1	1.00-1.74	Strongly Disagree/Not Aware

The respondents assessed the hazard mitigation practices of the Local Government Unit of Malvar. To be able to interpret the computed mean, the following mean ranges with their corresponding interpretations were used.

Numerical Value	Mean Ranges	Interpretation
4	3.25-4.00	Strongly Agree/Very Good
3	2.50-3.24	Agree/Good
2	1.75-2.49	Disagree/Fair
1	1.00-1.74	Strongly Disagree/Poor

The data gathered were subjected to statistical treatment using frequency and percentage, mean, chi-square and F-test.

III. DATA COLLECTION PROCEDURE

After the title and the statement of the problem have been finalized for the construction of the questionnaire, the researchers looked for needed information and started organizing the proposal. They made a letter for the approval of Associate Dean of Teacher Education Institution and Dean of Colleges to conduct their study in the Local Government Unit of Malvar. After the said officials signed the letter, the researchers presented it to the Mayor of Malvar. The Mayor organized a meeting with the barangay captains of the Municipality of Malvar to discuss the said research. The researchers coordinated with the barangay captains to distribute and administer the questionnaire among the household heads in the Local Government Unit of Malvar. They explained them the nature, goals and objectives of the study. The retrieved questionnaire were tallied, tabulated and interpreted in accordance with the items.

IV. RESULTS AND DISCUSSIONS

The data obtained underwent a thorough analysis and interpretation. This analysis includes a reiteration of the purpose of the study and the results of the data collected on the sample of household heads in the Local Government Unit of Malvar who responded to the survey.

Table 1. Percentage distribution of the respondents' profile

Profile Variables	Frequency	Percentage
Sex		
Male	80	53
Female	70	47
Age		
39 and above	35	23
34 – 38	49	33
29 – 33	30	20
24 – 28	22	15
23 and below	14	9
Length of stay in Malvar		
21 years and above	75	50
16 – 20	39	26
11 – 15	21	14
6 – 10	8	5
5 years and below	7	5
Monthly family income		
30,000 and above	24	16
25,000-29,999	45	30
20,000-24,999	36	24
15,000-19,999	16	11
10,000-14,999	17	11
9,999 and below	12	8

As seen from Table 1, majority of the respondents are male and under the age bracket of 34-38 years old. Most of them stayed in Malvar for 21 years and above with a monthly family income of 25,000-29,999.

Table 2. Respondents' awareness on typhoon as a natural disaster

Item Statements	Mean	Verbal Interpretation
1. The country is prone to typhoon because it is surrounded by warm ocean waters.	3.19	Agree
2. I know that there are five public storm warning signals (PSWS) used by PAGASA to warn me of the incoming weather disturbances.	3.16	Agree
3. I am aware of the meaning of the five PSWS which made me prepared for the bad storm.	3.03	Agree
4. The typhoon season is from June to November, but occasionally typhoons occur outside of the typhoon season.	3.05	Agree
5. I understand how PAGASA's color-coded rainfall advisories and classifications work.	2.95	Agree
6. I am mindful how a storm surge is produced and how water rises, commonly associated with low pressure.	2.86	Agree
7. I am familiar of the weather forecast symbols and terms used by PAGASA for appropriate response.	2.97	Agree
8. I am aware of the newly adopted category which is the "Super Typhoon", a severe tropical cyclone.	2.91	Agree
9. I am familiar with Philippine Area of Responsibility or PAR as used in monitoring typhoon activity.	2.73	Agree
10. I understand that typhoon is classified according to the wind's strength and/or heavy rain that may result to floods, landslides, etc.	3.01	Agree
Composite Mean	**2.99**	**Aware**

In determining the respondents' level of awareness on typhoon, the result indicates that household heads were aware regarding this matter as shown at Table 2. This is justified by the study of Institute of Philippine Culture (2011) about the social impacts of tropical storm Ondoy and typhoon Pepeng. It was found out that 85% of the respondents have greater awareness on the dangers of typhoon, flooding and possible mitigation measures following the mentioned typhoons.

Table 3. Assessment on hazard mitigation practices of the municipality in terms of physical structures

Item Statements	Mean	Verbal Interpretation
1. There are assigned evacuation centers for public's safety.	3.17	Agree
2. Health center is available for medical purposes.	3.08	Agree
3. There is a kitchen for food preparation.	2.83	Agree
4. There is a storage room for relief goods, medicines, and other supplies.	2.82	Agree
5. Barangay hall and covered courts are available as an alternative evacuation center.	2.89	Agree
Composite Mean	**2.96**	**Good**

Overall, the hazard mitigation practices of the municipality in terms of physical structures were good. Tanggol (2014) concluded that information, education, and communication campaign (IEC) regarding physical structures proved effective as residents readied themselves before the onslaught of the typhoon Glenda. The officials of Sorsogon province ensured the availability of buildings and rooms through organizing pre-emptive evacuation needed for such typhoon.

Table 4. Assessment on hazard mitigation practices of the municipality in terms of early warning system

Item Statements	Mean	Verbal Interpretation
1. Bells and alarms are available to alert the community of the impending disaster.	2.81	Agree
2. House to house information drive as its early warning system is directed.	2.68	Agree
3. Mobile patrols roam around the community to check all areas and provide assistance.	2.65	Agree
4. Visible signages are available to warn the public.	2.65	Agree
5. Orientation program regarding early warning system is conducted.	2.55	Agree
Composite Mean	**2.67**	**Good**

Table 4 shows that the hazard mitigation practices of the municipality regarding early warning system were good with a composite mean of 2.67. This is supported by the case study entitled Community-Based Early Warning System and Evacuation: Planning, Development and Testing, Protecting Peoples' Lives and Properties from Typhoon Risks in Dagupan City, Philippines (2007) illustrated the significance of setting up and operationalizing an early warning system and evacuation plan for typhoon to draw people together in pursuit of collective action towards building safe and resilient communities. It has been concluded that the residents there are conscious enough about the early warning system employed in their community.

Table 5. Assessment on hazard mitigation practices of the municipality in terms of planning tools

Item Statements	Mean	Verbal Interpretation
1. Evacuation plans are well-constructed, properly disseminated and posted conspicuously.	2.76	Agree
2. Development of land use plans to identify the most important local hazards.	2.59	Agree
3. Disaster plans are well-designed, properly coordinated and disseminated.	2.64	Agree
4. Evacuation map is provided to guide and provide escape in case of emergency.	2.57	Agree
5. Communication plan among family members is available in every household.	2.57	Agree
Composite Mean	**2.63**	**Good**

Gaining the composite mean of 2.63, the planning tools of the municipality as assessed by the respodents were good. Mendoza (2014) pointed out that the local government unit of Casiguran made planning tools for their safety. The people were informed by the barangay officials of the oncoming typhoon as early as two days before. When they knew there was a typhoon, they immediately prepared for safe evacuation. They started a capacity needs assessment where they identified all the gaps.

Table 6. Assessment on hazard mitigation practices of the municipality in terms of health – related measures

Item Statements	Mean	Verbal Interpretation
1. Available supply of potable water is ensured.	2.94	Agree
2. Adequate supply of food is stored accordingly.	2.94	Agree
3. There are available first aid kits (medicine, cotton, alcohol, other medical supplies) in case of emergency.	2.93	Agree
4. There are trained and licensed medical personnel to treat illnesses/injuries.	2.83	Agree
5. Health and sanitation facilities in evacuation centers are provided.	2.66	Agree
Composite Mean	**2.86**	**Good**

The composite mean of the respondents' assessment on hazard mitigation practices in terms of health-related measures is 2.86. An article proved that the hazard mitigation practices in terms of health-related measures were considered by the locality with the supervision of the government. The Department of Health (DOH) led clusters composed of the Medical and Public Health, Mental Health and Psycho-social Support (MHPSS), Nutrition and WASH sub-clusters of the DOH-Health Emergency Management System (HEMS) which aims to provide support for a timely and appropriate public health services to the affected population (2014). In this manner, people's needs regarding their health would be sustained by the government.

Table 7. Summary table of composite means for the assessment on hazard mitigation practices of the Municipality of Malvar

Assessment on Hazard Mitigation Practices	Composite Mean	Verbal Interpretation
Physical Structures	2.96	Good
Early Warning System	2.67	Good
Planning Tools	2.63	Good
Health – Related Measures	2.86	Good
Grand Composite Mean	**2.78**	**Good**

Table 7 presents that the hazard mitigation practices of the municipality in terms of physical structures, early warning system, planning tools, and health-related measures were good as assessed by the respondents. It gave off the composite mean of 2.96, 2.67, 2.63 and 2.86, respectively. Furthermore, the result revealed a grand composite mean of 2.78.

Table 8. Relationship between the respondents' profile and their awareness on typhoon as a natural disaster

Variables	Computed Value	Tabular Value	Decision (H_o)	Verbal Interpretation
Sex and Awareness on Typhoon as a Natural Disaster	7.958	7.815	Reject	Significant
Age and Awareness on Typhoon as a Natural Disaster	40.472	21.026	Reject	Significant
Length of Stay in Malvar and Awareness on Typhoon as a Natural Disaster	112.499	21.026	Reject	Significant
Monthly Family Income and Awareness on Typhoon as a Natural Disaster	61.025	24.996	Reject	Significant

The table shows that there exists a significant relationship between the respondents' profile in terms of sex, age, length of stay in Malvar and monthly family income and awareness on typhoon as a natural disaster. Climate-related hazards pose differential impacts on sex. In the Journal of Environmental Science and Management (2014), it was mentioned that males tend to participate in the rebuilding of physical structures. On the other hand, older women members of the household tend to have more burden in terms of caring for the sick, children and elderly during and after disasters. Age is found to be significant in determining the level of awareness on typhoon. Lucas (2009) stated that adult is more aware compare to young people when it comes to such matter because adult is already mature enough to handle their emotions.

A research confirmed that one's length of stay in a particular place is significantly related with his level of awareness on typhoon as a natural disaster. Malicad (2015) highlighted the responsibility of countries to provide financial and technological resources to developing nations so they can build their capacity to adapt and mitigate the effects of typhoon to human life with respect to their length of residency. Presumably, this will be done through the support of the development of National Adaptation Programs of Action (NAPA). Miller (2007) said that income is related to one's awareness on disaster. The most economically disadvantaged members of an affected community may be most vulnerable to the negative effects of a natural disaster, including poorer mental health outcomes. He concluded that the higher income a family have, the greater the chances they can survive.

Table 9. Comparison in the assessment of the respondents on hazard mitigation practices when grouped according to profile

Variables	Computed Value	Tabular Value	Decision (H_o)	Verbal Interpretation
Sex and Hazard Mitigation Practices	1.130	6.635	Accept	Not Significant
Age and Hazard Mitigation Practices	3.870	3.319	Reject	Significant
Length of Stay in Malvar and Hazard Mitigation Practices	4.580	3.319	Reject	Significant
Monthly Family Income and Hazard Mitigation Practices	0.860	3.017	Accept	Not Significant

The respondents' assessment on hazard mitigation practices when grouped according to sex has a f-computed value of 1.13 which is less than to its equivalent f-tabular value of 6.64.

The null hypothesis is accepted confirming that there is no significant difference. As to age and length of stay in Malvar, the f-computed values are 3.87 and 4.58, respectively with its similar equivalent f-tabular value of 3.32. Since the calculated values are greater than the tabular value, the null hypothesis is rejected indicating that there exists a significant difference. While monthly family income obtained the f-computed value of 0.86 and f-tabular value of 3.02. The calculated value is less than the tabular value making the null hypothesis an accepted one hence, signifying no significant difference. The no significant difference result is expected in terms of sex because all members, have equal chance of minimizing risks. It may be attributed to the fact that it does not matter whether you are a male or female, what important is that how you apply the hazard mitigation practices during calamities. There is a significant difference in the assessment of the respondents on hazard mitigation practices when grouped according to age. This is braced on the idea that adults are more mature and flexible than young ones. They are more ready to cope up with the situation every time there is disaster.

When the length of stay in Malvar was compared to the respondents' hazard mitigation practices, there exists a significant difference. The outcome is based on the reality that respondents who are basically living in a particular place for a long time are more familiar with the consequences of typhoon and more aware of how to prepare themselves before typhoon strikes. A significant difference existed in the assessment of the respondents on hazard mitigation practices in terms of monthly family income. The result is due to the fact that families who earn higher income but not aware on how to apply effective hazard mitigation practices may still put them to danger.

V. CONCLUSIONS AND RECOMMENDATIONS

Majority of the respondents were male and under the age bracket of 34-38 years old; stayed in Malvar for 21 years and above with a monthly family income of 25,000-29,999. They were aware on typhoon as a natural disaster. It was also concluded that the hazard mitigation practices of the Municipality of Malvar were good as assessed by the respondents. The respondents' profile in terms of sex, age, length of stay in Malvar and monthly family income are related significantly to their awareness on typhoon as a natural disaster. There is no significant difference in the assessment of the respondents on hazard mitigation practices when grouped according to sex and monthly family income. On the other hand, there exists a significant difference in the assessment of the respondents on hazard mitigation practices when grouped according to age and length of stay in Malvar. The findings of the study afforded the researchers in drawing various suggested activities to the office of the disaster information and risk reduction programs of the Local Government Unit of Malvar. The municipality may conduct seminars, workshops and orientation programs on terminologies regarding typhoon and other environmental issues. Drills and simulations in the school and community may be exercised. In addition, they may also raise funds to provide the needed supplies of the community. The aforementioned activities may be considered by the concerned authorities or agencies for maximum implementation and actualization.

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